

**REMARKS**

In the Office Action mailed February 3, 2005, the Examiner: (1) objected to claims 9, 11, 12, and 13; (2) objected to the specification; (3) rejected claims 1-3, 5, 12, 16-17, and 20 under 35 U.S.C. § 102(e); (4) rejected claims 6-7, 10-11, 14-15, 18-19, and 21-22 under 35 U.S.C. § 103(a); and (5) allowed claims 8, 9, and 13. Applicants thank the Examiner for indicating that claims 8, 9, and 13 contain patentable subject matter.

Applicants have amended claims 1 and 16 to clarify that eddy current resistance of a transformer is measured. Additionally, Applicants have amended claims 8-9 and 11-13 to correct errors, and has canceled claim 7. No new matter has been added. Applicants submit that claims 1-6 and 8-22 are in condition for allowance, and respectfully requests notice to this effect.

**I. Response to the Objections to Claims 9, 11, 12, and 13**

The Examiner objected to claims 9, 11, and 13 due to inconsistencies within the formulas. Applicants have amended claims 9, 11, and 13 by replacing "U" with "V" in the equations found in these claims. Additionally, the Examiner objected to claim 12 due to a grammatical error. Applicants have amended claim 12 by replacing "is" with "are" in the third line of claim 12. Accordingly, Applicants respectfully request withdrawal of the objections to claims 9, 11, 12, and 13.

**II. Response to the Objection to the Specification**

The Examiner objected to the specification due to inconsistencies within the formulas. Applicants have amended equations 1, 5, 6, 10, and 11 in the specification by replacing "U" with "V." Accordingly, Applicants respectfully request withdrawal of the objection to the specification.

**III. Response to the Rejection under 35 U.S.C. § 102(e)**

The Examiner rejected claims 1-3, 5, 12, 16-17, and 20 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,754,616 ("Sen"). In amended claims 1 and 16, Applicants recite a method and system for testing a transformer. The transformer is tested by applying a periodic test signal at different frequencies to a secondary of the transformer. A plurality of parameters is measured while the test signal is applied to the secondary of the transformer, including eddy current resistance. Power absorbed by the secondary of the transformer when the test signal is applied is measured to derive the eddy current resistance. By taking at least two measurements at different excitation frequencies, hysteresis losses can be separated from the eddy current losses of the transformer. (See, Applicants' Specification, page 13, lines 27-29.)

The Office Action states, and Applicants agree, that Sen does not disclose "deriving the eddy current resistance by measuring the power absorbed by the secondary of the transformer when a test signal having different frequencies is applied." (Office Action, paragraph 8.) The Office Action then states that the article "Eddy current add-on for frequency dependent representation of winding losses in transformer models used in computing electromagnetic transients" by A. Semlyen and F. De León ("Semlyen") derives eddy current resistance by measuring power absorbed by the secondary winding. (Office Action, paragraph 8.) However, Semlyen does not show or suggest

conducting a plurality of different measurements at different frequencies of a periodic test signal so as to determine the power absorbed by the secondary of the transformer during the individual measurements and derive from this the eddy current resistance.

Semlyen teaches that a Foster circuit can be connected to an existing transformer model for modeling eddy current losses in the windings. (See, e.g., Semlyen, Conclusions, page 213.) While Semlyen describes the relationship between power and resistance, this teaching alone does not suggest measuring power absorbed by the secondary at different frequencies and deriving the eddy current resistance from these measurements. The relationship between power and resistance ( $P=i^2R$  in its most simplistic form) is well known in the art. Furthermore, a teaching that resistance varies with frequency also does not suggest deriving the eddy current resistance by measuring the power absorbed by the secondary of the transformer when a test signal having different frequencies is applied.

Semlyen describes a frequency dependent resistance model for the representation of eddy current losses in the windings of a three-phase, two or three windings, transformer. (See, e.g., Semlyen, Abstract, page 209.) Semlyen provides a formula for the impedance of a multilayer cylindrical winding of a transformer. (See Semlyen, equation 4, page 210.) However, contrary to Applicants' claimed invention, Semlyen does not propose to conduct measurements of the transformer at a plurality of different frequencies in order derive the eddy current resistance from these measurements. In particular, Semlyen does not disclose applying a periodic test signal at different frequencies to a secondary of a transformer as Semlyen does not disclose applying a periodic test signal at different frequencies at all. Semlyen only considers the losses of a transformer and the impedance of the windings of the transformer in general. (See, e.g., Semlyen,

equations 3a, 3b, and 4, page 210.) However, Semlyen does not show or suggest measuring the power absorbed by the secondary of the transformer to derive from this the eddy current resistance.

Because Semlyen does not show or suggest conducting a plurality of different measurements at different frequencies of a periodic test signal so as to determine the power absorbed by the secondary of the transformer during the individual measurements and derive from this the eddy current resistance, the combination of Sen and Semlyen does not show or suggest each and every element of claims 1 and 16. Thus, Applicants submit that claims 1 and 16 are not anticipated by Sen or obvious in light of the combination of Sen and Semlyen.

Claims 2-3, 5, and 12 depend from claim 1. Claims 17 and 20 depend from claim 16. Accordingly, the Applicants also submit that claims 2-3, 5, 12, 17, and 20 are not anticipated by Sen or obvious in light of the combination of Sen and Semlyen for at least the reasons described above with reference to claims 1 and 16.

In light of the above, Applicants respectfully request withdrawal of the rejections under 35 U.S.C. § 102(e).

#### **IV. Response to the Rejections under 35 U.S.C. § 103(a)**

The Examiner rejected claims 6-7, 10-11, 14-15, 18-19, and 21-22 under 35 U.S.C. § 103(a) as being unpatentable over Sen in view of the knowledge of one skilled in the art, U.S. Patent No. 6,072,310 ("Krebs"), U.S. Patent No. 5,500,598 ("Ford"), the article "A Simple Scalar Model for Magnetic Hysteresis" ("Tellinen"), or U.S. Patent Application Serial No. 2002/0161558 ("Georges"). Applicants have canceled claim 7, therefore the rejection of claim 7 is moot. Claims 6, 10-11, and 14-15 depend from claim 1. Claims 18-19 and 21-22 depend from claim 16.

McDonnell Boehnen Hulbert & Berghoff LLP  
300 South Wacker Drive  
Chicago, IL 60606  
Telephone: (312) 913-0001

14

As described above, neither Sen nor Semlyen show or suggest deriving the eddy current resistance by measuring the power absorbed by the secondary of the transformer when a test signal having different frequencies is applied. The knowledge of one skilled in the art as identified in the Office Action and the teachings of the other cited references as identified in the Office Action fail to overcome the deficiencies identified in Sen and Semlyen. Thus, Applicants submit that claims 6, 10-11, 14-15, 18-19, and 21-22 are not obvious in light of the combination of Sen with the knowledge of one skilled in the art as identified in the Office Action, Krebs, Ford, Tellinen, or Georges for at least the reasons describe above with reference to claims 1 and 16.


In light of the above, Applicants respectfully request withdrawal of the rejections under 35 U.S.C. § 103(a).

### CONCLUSION

In light of the above amendments and remarks, Applicants submit that the present application is in condition for allowance and respectfully request notice to this effect. The Examiner is requested to contact Applicants' representative below if any questions arise or she may be of assistance to the Examiner.

Respectfully submitted,

Date: May 3, 2005

By: 

Lisa M. Schoedel  
Reg. No. 53,546  
McDonnell Boehnen Hulbert & Berghoff LLP  
300 South Wacker Drive  
Chicago, Illinois 60606-6709  
312 935 2362  
schoedel@mbhb.com

McDonnell Boehnen Hulbert & Berghoff LLP  
300 South Wacker Drive  
Chicago, IL 60606  
Telephone: (312) 913-0001

15